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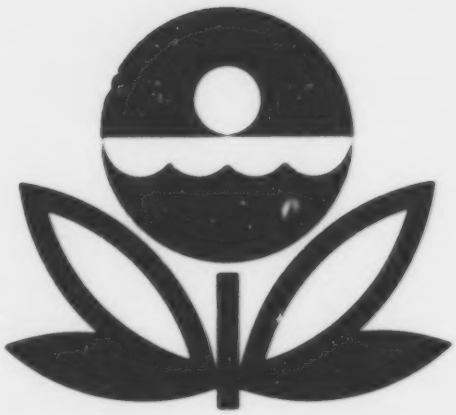

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REPORT

ON

BANKHEAD LAKE AND HOLT LOCK AND DAM

WALKER AND TUSCALOOSA COUNTIES

ALABAMA

EPA REGION IV

WORKING PAPER NO. 226

WITH THE COOPERATION OF THE

ALABAMA WATER IMPROVEMENT COMMISSION

AND THE

ALABAMA NATIONAL GUARD

JULY 1976

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point source discharge reduction and nonpoint source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the singl lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's freshwater lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by the U.S. Environmental Protection Agency and to augment plans implementation by the states.

ACKNOWLEDGEMENTS

The staff of the National Eutrophication Survey (Office of Research and Development, U.S. Environmental Protection Agency) expresses sincere appreciation to the Alabama Water Improvement Commission for professional involvement and to the Alabama National Guard for conducting the tributary sampling phase of the Survey.

E. John Williford, Chief, Surveillance and Monitoring Section; and John C. Chitwood, Biologist, Surveillance and Monitoring Section; and Sam L. Coleman, Water Quality Planning Section; and M. H. Floyd, Engineer, Surveillance and Monitoring Section; and Truman Green, Engineer, Municipal Waste Control Section; and Tim McCartha, Biologist, Surveillance and Monitoring Section; and James E. McIndoe, Engineer, Water Quality Planning Section; and Richard T. Maddox, Engineer, Industrial Waste Control Section; and James T. White, Engineer, Municipal Waste Control Section provided invaluable lake documentation and counsel during the course of the Survey.

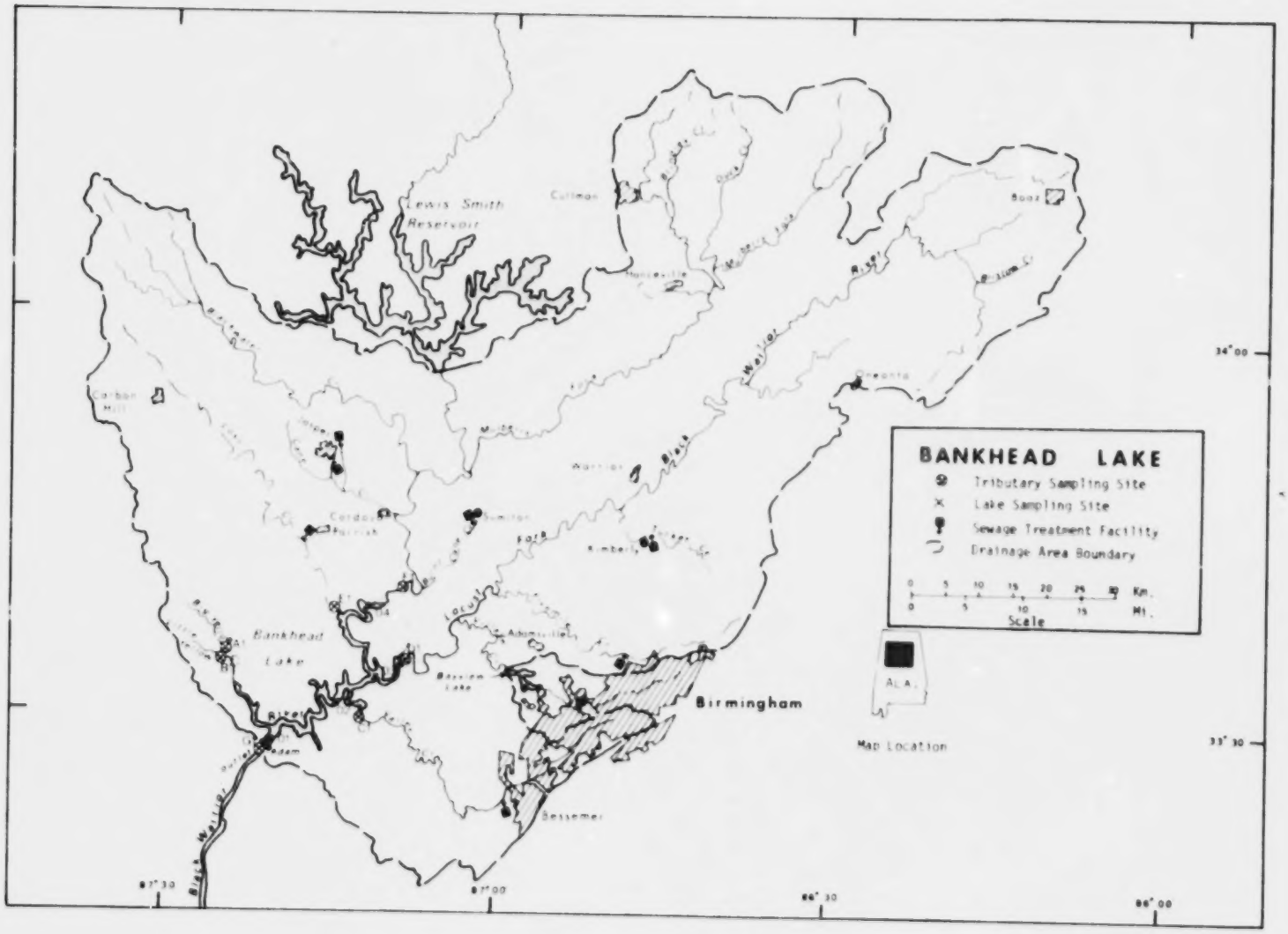
Major General Charles A. Rollo, Adjutant General of Alabama, and Project Officer Lt. Col. Wash B. Ray, who directed the volunteer efforts of the Alabama National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF ALABAMA

LAKE NAME	COUNTY
Bankhead	Walker
Gantt	Covington
Guntersville	Marshall, Johnson
Holt Lock and Dam	Tuscaloosa
Lay	Chilton, Coosa
Martin	Elmore, Tallapoosa
Mitchell	Coosa, Chilton
Pickwick	Colbert, Lauderdale (Tishomingo in MS and Hardin in TN)
Purdy	Jefferson, Shelby
Weiss	Cherokee
Wilson	Lauderdale, Colbert, Lawrence


Lewis Smith Reservoir
Cullman
Jasper
Warrior
Bankhead Lake
Birmingham
Bessemer
BANKHEAD LAKE
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
Scale
Km.
Mi.
ALA.
Map Location
34°00
33°30
87°30
87°00
86°30
86°00

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16. ABSTRACT
Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
eutrophication lakes nutrients phosphorus nitrogen loading		05B 05C

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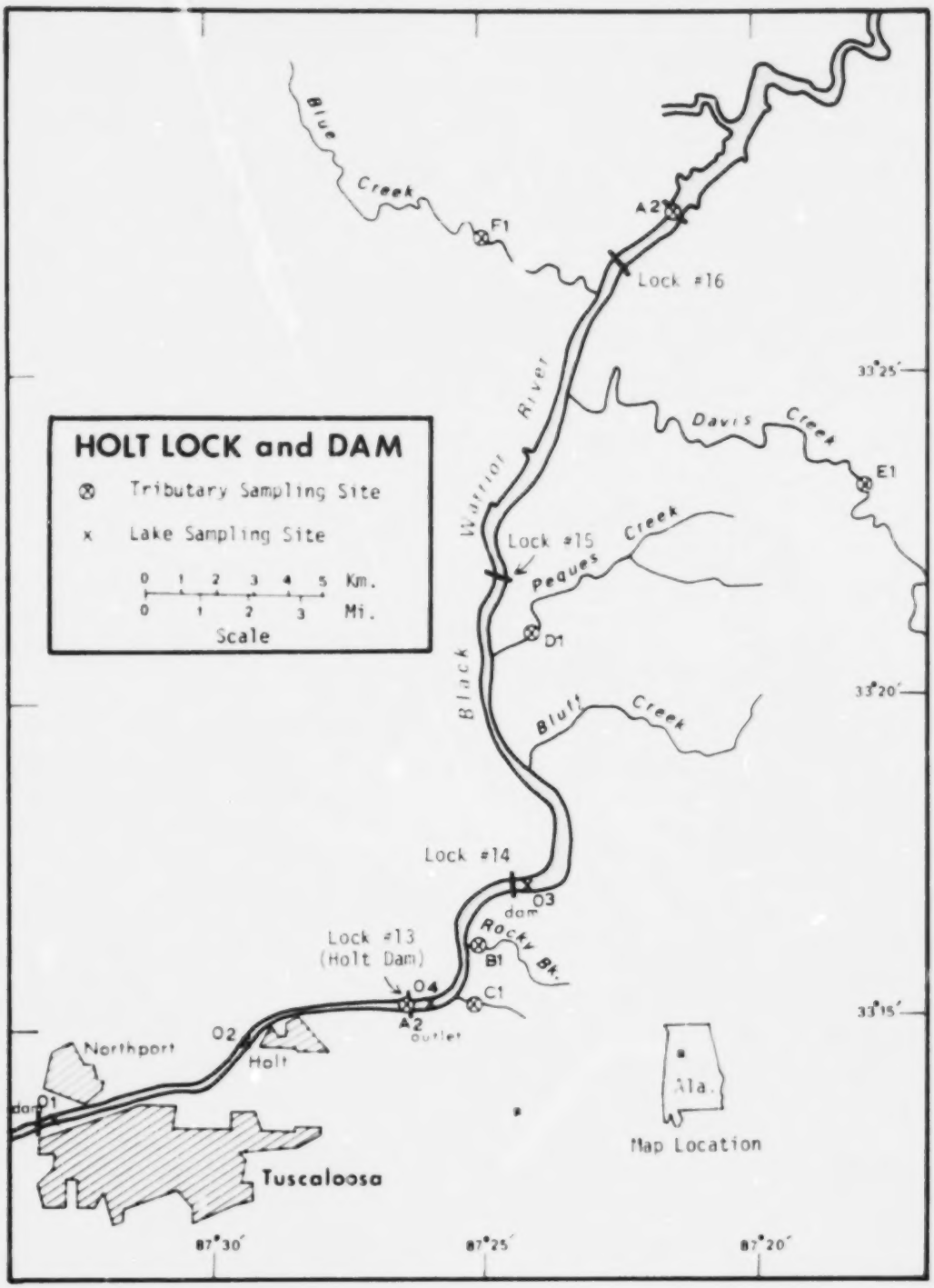
HOLT LOCK and DAM
⊗ Tributary Sampling Site
x Lake Sampling Site
0 1 2 3 4 5 Km.
0 1 2 3 Mi.
Scale
Blue Creek
F1
A2
Lock #16
Warrior River
Davis Creek
E1
33°25′
Lock #15
Pegues Creek
D1
Black
Bluff Creek
33°20′
Lock #14
O3
dam
Rocky Bk.
B1
Lock #13
(Holt Dam)
O4
C1
A2
outlet
33°15′
Northport
O2
Holt
dam
O1
Tuscaloosa
Ala.
Map Location
87°30′
87°25′
87°20′

REPORT ON BANKHEAD LAKE AND HOLT LOCK AND DAM

STORET NUMBERS 0101 AND 0105

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Bankhead Lake and Holt Lock and Dam are eutrophic (i.e., nutrient rich and highly productive). Whether such nutrient enrichment is to be considered beneficial or deleterious is determined by its actual or potential impact upon designated beneficial water uses of each lake.

Of the 11 Alabama lakes sampled in 1973, only Holt Lock and Dam had higher median inorganic nitrogen levels than Bankhead Lake (Appendix E). In both impoundments, dissolved oxygen concentrations were depressed and Secchi disc transparencies were low. Pollution tolerant genera were predominant among the phytoplankton identified, although in low concentrations probably due to toxic substances in the water and short reservoir retention times (EPA, 1975). Survey limnologists reported a continuous surface oil film at Holt Lock and Dam, apparently generated by coal barges and barge loading sites along the reservoir.

Other studies (EPA, 1975) indicate that there are 18 municipal and 73 industrial waste sources discharging into the Black Warrior River and its tributaries upstream from Bankhead Lake. Excessive surface coal mining operations in the Bankhead watershed contribute high concentrations of zinc and manganese and lower the pH levels in both reservoirs. The EPA report recommended the reduction of both industrial and municipal waste loads into Bankhead Reservoir to improve water quality and reduce potential for algal blooms.

B. Rate-Limiting Nutrient:

Algal assay results indicate that both Bankhead Lake and Holt Lock and Dam were limited by available phosphorus levels. Spikes of phosphorus, and nitrogen and phosphorus simultaneously resulted in increases in assay yield. Additions of nitrogen alone did not stimulate a growth response. The ratios of inorganic nitrogen to orthophosphorus (N/P) in sampled waters further suggest primary limitation by phosphorus in the reservoir.

C. Nutrient Controllability:

1. Point sources -

Nutrient loading to both Black Warrior River reservoirs was far higher than the eutrophic levels proposed by Vollenweider (1975) for lakes with such volumes and retention times. Loading to Bankhead Lake was approximately seven times the eutrophic loading, while the

impoundment at Holt Lock and Dam was four times the eutrophic level. However, Vollenweider's model probably does not apply to water bodies with short hydraulic retention times, and the mean hydraulic retention times of Bankhead Lake and Holt Lock and Dam are only seven and six days, respectively.

The mean annual phosphorus load from known point sources was estimated to be 70.4% of the total reaching Bankhead Lake. Of the point source load, the city of Birmingham contributed a total of 50.4% from two wastewater plants, and the city of Bessemer contributed 16.5% While elimination of point source loading to the lake would substantially reduce the overall load, nutrient input would still exceed Vollenweider's eutrophic rate. Concurrent control of nonpoint sources, through application of proper land use practices and reduction of presently unmeasured point sources (EPA, 1975) would be required to upgrade water quality.

There are no known point sources directly impacting Holt Lock and Dam. However, elimination of the point sources impacting Bankhead Lake would be expected to substantially improve water quality of Holt Lock and Dam.

2. Nonpoint sources -

The Locust and Mulberry Forks of the Black Warrior River were estimated to contribute 27.2% of the total phosphorus load to Bankhead Lake, and the Black Warrior River contributed 96.7% of the total to Holt Lock and Dam. Additional sampling is needed to determine to what degree these nonpoint background loads are overestimated due to unmeasured point sources, particularly industrial, which impact the Black Warrior River.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

Lake and drainage basin characteristics are itemized below. Lake surface areas and mean depths were provided by the Alabama Water Improvement Commission; maximum depths were estimated on the basis of National Eutrophication Survey (NES) sampling data; tributary data were provided by the Alabama District Office of the U.S. Geological Survey (USGS) (outlet drainage areas include the lake surface area). Mean hydraulic retention times were obtained by dividing the lake volumes by mean flows of the outlets. Precipitation values are estimated by methods as outlined in NES Working Paper No. 175. A table of metric/English conversions is included as Appendix A.

A. Lake Morphometry:	Bankhead Lake	Holt Lock and Dam	
1. Surface area:	37.23	13.36	km^2.
2. Mean depth:	3.1	7.9	meters.
3. Maximum depth:	21.3	23.8	meters.
4. Volume:	115.413	105.544	x 10^6 m^3.
5. Mean hydraulic retention time:	7	6	days

B. Tributary and Outlet (See Appendix B for flow data):

1. Tributaries -

Bankhead Lake			Holt Lock and Dam		
Name	Drainage area(km^2)	Mean flow (m^3/sec)	Name	Drainage area(km^2)	Mean flow (m^3/sec)
A(1) Big Yellow Creek	38.1	0.20	A(1) Black Warrior River	10,334.1	179.80
B(1) Little Yellow Creek	40.2	0.21	B(1) Rocky Branch	5.4	0.09
C(1) Valley Creek	647.5	12.55	C(1) Unnamed Stream	4.7	0.08
D(1) Locust Fork (Black Warrior River)	3,061.4	52.52	D(1) Peques Creek	29.0	0.47
E(1) Lost Creek	888.4	5.16	E(1) Davis Creek	224.3	3.63
F(1) Mulberry Fork (Black Warrior River)	5,161.9	101.09	F(1) Blue Creek	96.9	2.73
Minor tributaries and immediate drainage	460.0	8.05	Minor tributaries and immediate drainage	253.4	4.31
Total	10,297.5	179.78	Total	10,947.8	191.11

2. Outlet -

G(1) Black Warrior River	10,334.1	178.63	A(2) Black Warrior River	10,960.9	191.39

C. Precipitation:

	Bankhead Lake	Holt Lock and Dam	
1. Year of sampling:	167.9	170.8	cm.
2. Mean annual:	135.2	126.8	cm.

III. LAKE WATER QUALITY SUMMARY

Bankhead Lake and Holt Lock and Dam were sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from four stations on each lake and from a number of depths at each station (see maps, pages v-vi). During each visit, depth-integrated samples were collected from each station for chlorophyll a analysis and phytoplankton identification and enumeration. During the first visit, 18.9-liter depth-integrated samples were composited for algal assays. Maximum depths sampled, expressed in meters, were:

Station	Bankhead Lake	Holt Lock and Dam
1	17.7	11.0
2	20.1	7.6
3	10.7	18.0
4	9.8	22.6

For a more detailed explanation of NES methods, see NES Working Paper No. 175.

The results obtained are presented in full in Appendix C and are summarized in III-A for waters at the surface and at the maximum depth for each site. Results of the phytoplankton counts and chlorophyll a determinations are included in III-B. Results of the limiting nutrient study are presented in III-C.

[illegible]

PHYSICAL AND CHEMICAL CHARACTERISTICS

PARAMETER	%*	[illegible]	[illegible]	MAX DEPTH RANGE (METERS)	%*	RANGE	MEDIAN	MAX DEPTH RANGE (METERS)	%*	RANGE	MEDIAN	MAX DEPTH RANGE (METERS)
[illegible]												
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]												
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]												
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL ALKALINITY (MG/L)												
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL P (MG/L)												
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DISSOLVED ORTHO P (MG/L)												
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
NO2+NO3 (MG/L)												
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
AMMONIA (MG/L)												
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]												
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SECCHI DISC (METERS)												
	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	

* % = [illegible] OF SAMPLES
** MAXIMUM DEPTH SAMPLED AT [illegible] SITE
*** % = [illegible] OF SITES SAMPLED ON THIS DATE

HOLT LOCK AND DAM
STREET CODE (10)

PHYSICAL AND CHEMICAL CHARACTERISTICS

PARAMETER	N*	(6/ 7/73) Sooo = 4 RANGE	MEDIAN	MAX DEPTH RANGE (METERS)	N*	(9/29/73) Sooo = 4 RANGE	MEDIAN	MAX DEPTH RANGE (METERS)	N*	(10/31/73) Sooo = 4 RANGE	MEDIAN	MAX DEPTH RANGE (METERS)
TEMPERATURE (DEG CENT)												
0.-1.5 M DEPTH	4	23.1- 24.5	24.0	0.0- 0.0	4	28.0- 29.9	28.3	0.0- 1.5	4	20.8- 22.4	21.3	0.0- 1.5
MAX DEPTH**	4	21.8- 23.1	22.5	6.1- 22.6	4	26.5- 28.2	27.2	4.6- 21.3	4	19.3- 22.3	21.4	7.6- 19.8
DISSOLVED OXYGEN (MG/L)												
0.-1.5 M DEPTH	4	*****-*****	*****	*****-*****	4	4.2- 6.4	4.4	1.5- 1.5	4	4.6- 7.4	6.1	1.5- 1.5
MAX DEPTH**	4	4.2- 6.0	5.3	6.1- 22.6	4	1.4- 5.6	3.3	4.6- 21.3	4	4.6- 7.8	6.0	7.6- 19.8
CONDUCTIVITY (UMHOS)												
0.-1.5 M DEPTH	4	153.- 205.	160.	0.0- 0.0	4	172.- 187.	177.	0.0- 1.5	4	155.- 164.	162.	0.0- 1.5
MAX DEPTH**	4	130.- 160.	144.	6.1- 22.6	4	164.- 175.	174.	4.6- 21.3	4	126.- 165.	161.	7.6- 19.8
PH (STANDARD UNITS)												
0.-1.5 M DEPTH	4	6.6- 6.9	6.8	0.0- 0.0	4	6.5- 6.8	6.6	0.0- 1.5	3	6.8- 6.9	6.8	0.0- 1.5
MAX DEPTH**	4	6.6- 6.9	6.8	6.1- 22.6	4	6.4- 6.5	6.4	4.6- 21.3	3	6.8- 6.8	6.8	7.6- 19.8
TOTAL ALKALINITY (MG/L)												
0.-1.5 M DEPTH	4	24.- 32.	28.	0.0- 0.0	4	18.- 22.	21.	0.0- 1.5	4	18.- 21.	20.	0.0- 1.5
MAX DEPTH**	4	14.- 27.	22.	6.1- 22.6	4	18.- 23.	22.	4.6- 21.3	4	10.- 21.	19.	7.6- 19.8
TOTAL P (MG/L)												
0.-1.5 M DEPTH	4	0.033-0.056	0.045	0.0- 0.0	4	0.006-0.010	0.007	0.0- 1.5	4	0.013-0.022	0.016	0.0- 1.5
MAX DEPTH**	4	0.029-0.056	0.046	6.1- 22.6	4	0.007-0.009	0.008	4.6- 21.3	4	0.016-0.024	0.018	7.6- 19.8
DISSOLVED ORTHO P (MG/L)												
0.-1.5 M DEPTH	4	0.004-0.023	0.009	0.0- 0.0	4	0.003-0.005	0.004	0.0- 1.5	4	0.004-0.008	0.006	0.0- 1.5
MAX DEPTH**	4	0.003-0.017	0.004	6.1- 22.6	4	0.004-0.005	0.004	4.6- 21.3	4	0.005-0.009	0.005	7.6- 19.8
NITROGEN (MG/L)												
0.-1.5 M DEPTH	4	0.510-0.720	0.660	0.0- 0.0	4	0.600-0.740	0.645	0.0- 1.5	4	0.640-0.940	0.800	0.0- 1.5
MAX DEPTH**	4	0.620-0.720	0.680	6.1- 22.6	4	0.740-0.860	0.765	4.6- 21.3	4	0.600-0.930	0.750	7.6- 19.8
AMMONIA (MG/L)												
0.-1.5 M DEPTH	4	0.170-0.300	0.210	0.0- 0.0	4	0.060-0.260	0.125	0.0- 1.5	4	0.020-0.120	0.045	0.0- 1.5
MAX DEPTH**	4	.100-0.250	0.220	6.1- 22.6	4	0.040-0.090	0.070	4.6- 21.3	4	0.020-0.120	0.060	7.6- 19.8
AUELUAME 4 (MG/L)												
0.-1.5 M DEPTH	4	0.400-0.700	0.550	0.0- 0.0	4	0.200-0.400	0.400	0.0- 1.5	4	0.200-0.500	0.200	0.0- 1.5
MAX DEPTH**	4	0.400-0.400	0.400	6.1- 22.6	4	0.200-0.300	0.300	4.6- 21.3	4	0.200-0.300	0.250	7.6- 19.8
SECCHI DISC (METERS)	4	0.5- 0.9	0.8		4	1.0- 1.8	1.5		4	1.0- 1.8	1.5	

* N = NO. OF SAMPLES
** MAXIMUM DEPTH SAMPLED AT EACH SITE
*** S = NO. OF SITES SAMPLED ON THIS DATE

B. Biological Characteristics:

1. Phytoplankton -

Bankhead Lake			Holt Lock and Dam		
Sampling Date	Dominant Genera	Number per ml	Sampling Date	Dominant Genera	Number per ml
06/08/73	1. Actinastrum	780	06/08/73	1. Flagellates	664
	2. Flagellates	360		2. Cryptomonas	521
	3. Cyclotella	134		3. Actinastrum	234
	4. Melosira	134		4. Dinoflagellates	143
	5. Ankistrodesmus	113		5. Cyclotella	39
	Other genera	290		Other genera	27
	Total	1,811		Total	1,628
08/29/73	1. Flagellates	610	08/29/73	1. Flagellates	315
	2. Synedra	173		2. Cryptomonas	281
	3. Oscillatoria	153		3. Cyclotella	192
	4. Raphidiopsis	102		4. Synedra	169
	5. Melosira	101		5. Dactylococcopsis	150
	Other genera	327		Other genera	435
	Total	1,466		Total	1,542
10/30/73	1. Flagellates	699	10/31/73	1. Flagellates	89
	2. Scenedesmus	97		2. Kirchneriella	22
	3. Melosira	78		3. Scenedesmus	22
	4. Cryptomonas	58		4. Merismopedia	11
	5. Synedra	29		5. Nitzschia	11
	Other genera	254		Other genera	2
	Total	1,215		Total	157

2. Chlorophyll a -

Bankhead Lake			Holt Lock and Dam		
Sampling Date	Station Number	Chlorophyll a (ug/l)	Sampling Date	Station Number	Chlorophyll a (ug/l)
06/08/73	1	2.1	06/08/73	1	2.2
	2	7.2		2	2.6
	3	4.8		3	2.7
	4	3.6		4	3.4
08/29/73	1	4.6	08/29/73	1	2.6
	2	4.5		2	2.2
	3	7.2		3	3.6
	4	3.6		4	3.7
10/30/73	1	1.0	10/31/73	1	0.3
	2	3.1		2	0.7
	3	5.4		3	1.3
	4	1.1		4	0.9

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

	Bankhead Lake			Holt Lock and Dam		
Spike(mg/l)	Ortho P Conc.(mg/l)	Inorganic N Conc.(mg/l)	Maximum Yield (mg/l-dry wt.)	Ortho P Conc.(mg/l)	Inorganic N Conc.(mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.015	0.640	1.3	0.015	0.735	0.8
0.010 P	0.025	0.640	7.8	0.025	0.735	3.8
0.020 P	0.035	0.640	12.8	0.035	0.735	9.1
0.050 P	0.065	0.640	16.4	0.065	0.735	14.7
0.025 P + 0.5 N	0.040	1.140	15.1	0.040	1.235	9.5
0.050 P + 1.0 N	0.065	1.640	25.2	0.065	1.735	21.9
1.0 N	0.015	1.640	1.5	0.015	1.735	1.0

2. Filtered and nutrient spiked -

	Bankhead Lake			Holt Lock and Dam		
Spike(mg/l)	Ortho P Conc.(mg/l)	Inorganic N Conc.(mg/l)	Maximum Yield (mg/l-dry wt.)	Ortho P Conc.(mg/l)	Inorganic N Conc.(mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.008	0.624	0.2	0.010	0.734	0.1
0.010 P	0.018	0.624	5.9	0.020	0.734	5.9
0.020 P	0.028	0.624	9.1	0.030	0.734	10.4
0.050 P	0.058	0.624	15.1	0.060	0.734	17.2
0.025 P + 0.5 N	0.033	1.124	10.0	0.035	1.234	17.0
0.050 P + 1.0 N	0.058	1.624	23.7	0.060	1.734	29.6
1.0 N	0.008	1.624	0.2	0.010	1.734	0.2

2. Discussion -

The control yields of the assay alga, Selenastrum capricornutum, indicate that the potentials for primary production in Bankhead Lake and Holt Lock and Dam were moderate to high at the time of sample analyses. In both assays, increases in yield with the addition of phosphorus as well as the lack of response when only nitrogen was added indicate phosphorus limitation. Maximum growth potential was achieved with the simultaneous addition of both phosphorus and nitrogen.

The spring N/P ratios in the field were about 56/1 in Bankhead Lake, and 76/1 in Holt Lock and Dam, indicating primary limitation by phosphorus at the time of assay sample collection. N/P ratios for the entire sampling year in Bankhead and Holt Lock and Dam were 93/1 and 104/1, respectively, also indicating phosphorus limitation (an N/P ratio of 14/1 or greater generally reflects phosphorus limitation).

IV. NUTRIENT LOADINGS
(See Appendix D for data)

For the determination of nutrient loadings, the Alabama National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the maps (pages v-vi), except for the high runoff months of January and February when two samples were collected. Sampling was begun in March 1973, and was completed in February 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Alabama District Office of the USGS for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries, except Valley Creek and the Locust Fork of the Black Warrior River (Bankhead Reservoir), were determined by using a modification of the USGS computer program for calculating stream loadings. Nutrient loads indicated for tributaries are those measured minus known point source loads, if any.

Nutrient loadings for unsampled "minor tributaries and immediate drainage" ("ZZ" of USGS) and Valley Creek and Locust Fork were estimated by using the mean annual nutrient loads for Big Yellow, Little Yellow Creek, Pequesa Creek, Davis Creek, and Blue Creek at Stations 0101A1 and B1, and 0105D1, E1, and F1 and multiplying the means by the appropriate drainage area in km^2.

The operators of the Bessemer, Kimberly, Birmingham (Five Mile Creek and Valley Creek) and Jasper wastewater treatment plants provided monthly effluent samples and corresponding flow data. Nutrient loads for the cities of Parrish and Sumiton wastewater treatment plants were estimated at 1.134 kg P and 3.401 kg N/Capita/year.

A. Waste Sources: Bankhead Lake only

1. Known municipal -

Name	Population Served	Treatment	Mean Flow ($m^3/d \times 10^3$)	Receiving Water
Valley Creek (Bessemer)	100,000	Primary clarification	56.529	Valley Creek
Turkey Creek (Kimberly)	1,500	Activated sludge	1.156	Turkey Creek/ Locust Fork/ Black Warrior River
Five Mile Creek (Birmingham)	10,000	Primary clarification	22.713	Five Mile Creek
Village Creek (Birmingham)	315,000	Primary clarification	135.168	Village Creek/ Black Warrior River
Parrish	175	Activated sludge	0.066*	Lost Creek/ Black Warrior River
Sumiton	2,374	Stabilization pond	0.898*	Burnt Corn Creek/ Mulberry Fork/ Black Warrior River
Jasper **	18,000	Trickling filter	9.551	Town Creek/ Mulberry Fork/ Black Warrior River

*Estimated at 0.3795 m^3/capita/day.
**Treats poultry processing and feed mill wastes in addition to domestic waste.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Bankhead Lake

Source	kg P/yr	% of total
a. Tributaries (nonpoint load) -		
A(1) Big Yellow Creek	140	<0.1
B(1) Little Yellow Creek	190	<0.1
C(1) Valley Creek	5,830	0.9
D(1) Locust Fork (Black Warrior River)	27,555	4.2
E(1) Lost Creek	4,335	0.7
F(1) Mulberry Fork (Black Warrior River)	149,610	23.0
b. Minor tributaries and immediate drainage (nonpoint load)	4,140	0.6
c. Known Municipal STP's -		
Valley Creek (Bessemer)	107,375	16.5
Turkey Creek (Kimberly)	710	0.1
Five Mile Creek (Birmingham)	26,540	4.1
Village Creek (Birmingham)	301,420	46.3
Parrish*	200	<0.1
Sumiton*	2,690	0.4
Jasper	19,895	3.0

*Estimated.

Holt Lock and Dam

Source	kg P/yr	% of total
a. Tributaries (nonpoint load) -		
A(1) Black Warrior River	218,870	96.7
B(1) Rocky Branch	60	<0.1
C(1) Unnamed Stream	50	<0.1
D(1) Peques Creek	185	0.1
E(1) Davis Creek	2,825	1.3
F(1) Blue Creek	1,855	0.8
b. Minor tributaries and immediate drainage (nonpoint load)	2,280	1.0
c. Known Municipal STP's -	None	

Bankhead Lake			Holt Lock and Dam		
Source	kg P/yr	% of total	Source	kg P/yr	% of total
d. Septic tanks* -	20	<0.1	d. Septic tanks* -	10	<0.1
e. Known industrial -	None		e. Known industrial -	None	
f. Direct precipitation** -	650	0.1	f. Direct precipitation** -	235	0.1
Total	651,300	100.0	Total	226,370	100.0
2. Outputs -					
G(1) Black Warrior River	218,870		A(2) Black Warrior River	149,105	
3. Net annual P accumulation -	432,430			77,265	

*Estimate for Bankhead Lake based on 75 lakeside residences.
Estimate for Holt Lock and Dam based on 30 lakeside residences.

**Estimated (see NES Working Paper No. 175).

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Bankhead Lake

Source	kg N/yr	% of total
a. Tributaries (nonpoint load)		
A(1) Big Yellow Creek	5,245	0.1
B(1) Little Yellow Creek	4,390	0.1
C(1) Valley Creek	281,665	4.3
D(1) Locust Fork (Black Warrior River)	1,331,710	20.2
E(1) Lost Creek	171,115	2.6
F(1) Mulberry Fork (Black Warrior River)	3,484,445	52.8
b. Minor tributaries and immediate drainage (nonpoint load)	200,100	3.0
c. Known Municipal STP's -		
Valley Creek (Bessemer)	209,845	3.2
Turkey Creek (Kimberly)	1,410	< 0.1
Five Mile Creek (Birmingham)	51,420	0.8
Village Creek (Birmingham)	755,290	11.5
Parrish*	595	< 0.1
Sumiton*	8,075	0.1
Jasper	51,375	

Holt Lock and Dam

Source	kg N/yr	% of total
a. Tributaries (nonpoint load)		
A(1) Black Warrior River	9,588,085	96.3
B(1) Rocky Branch	3,590	<0.1
C(1) Unnamed Stream	3,275	<0.1
D(1) Peques Creek	13,890	0.1
E(1) Davis Creek	140,975	1.4
F(1) Blue Creek	79,395	0.8
b. Minor tributaries and immediate drainage (nonpoint load)	110,230	1.1
c. Known Municipal STP's - None		

* Estimated

Bankhead Lake			Holt Lock and Dam		
Source	kg N/yr	% of total	Source	kg N/yr	% of total
d. Septic tanks* -	800	<0.1	d. Septic tanks* -	105	<0.1
e. Known industrial -	None		e. Known industrial -	None	
f. Direct precipitation** -	40,195	0.6	f. Direct precipitation** -	14,425	0.1
Total	6,597,675	100.0	Total	9,953,970	100.0
2. Outputs -					
G(1) Black Warrior River	9,588,085		A(2) Black Warrior River	9,491,100	
3. Net annual N export***	2,990,410		Net annual N accumulation	462,870	

*Estimate for Bankhead Lake based on 75 lakeside residences.
Estimate for Holt Lock and Dam based on 30 lakeside residences.

**Estimated (See NES Working Paper No. 175).

***Export probably due to unknown sources and/or sampling error.

D. Mean Annual Nonpoint Nutrient Export by Subdrainage Area:

Tributary	kg P/km^2/yr	kg N/km^2/yr
Big Yellow Creek	4	138
Little Yellow Creek	5	109
Valley Creek	9	435
Locust Fork (Black Warrior River)	9	435
Lost Creek	5	193
Mulberry Fork (Black Warrior River)	29	676
Black Warrior River	21	916
Rocky Branch	11	665
Unnamed Stream	11	697
Peques Creek	6	479
Davis Creek	12	628
Blue Creek	19	819

F. Yearly Loadings:

In the following table, the existing phosphorus annual loading is compared to the relationship proposed by Vollenweider (1975). Essentially, his eutrophic loading is that at which the receiving waters would become eutrophic or remain eutrophic; his oligotrophic loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between eutrophic and oligotrophic.

Note that Vollenweider's model may not apply to lakes with short hydraulic retention times or in which light penetration is severely restricted by high concentrations of suspended solids in the surface waters.

Total Yearly Phosphorus Loading ($g/m^2/yr$)	Bankhead	Holt Lock
Estimated loading for	17.49	16.94
Vollenweider's eutrophic loading	2.40	4.18
Vollenweider's oligotrophic loading	1.20	2.09

V. LITERATURE REVIEWED

U.S. EPA, 1975. Bankhead Reservoir, Birmingham, Alabama. Environmental Protection Agency Surveillance and Analysis Division, Biological Services Branch, Athens, Georgia.

U.S. Environmental Protection Agency. 1975. National Eutrophication Survey Methods 1973-1976. Working Paper No. 175. National Environmental Research Center, Las Vegas, Nevada, and Pacific Northwest Environmental Research Laboratory, Corvallis, Oregon.

Vollenweider, R. A., 1975. Input-Output Models With Final Reference to the Phosphorus Loading Concept in Limnology. Schweiz. Z. Hydrol. 37: 53-84.

VI. APPENDICES

APPENDIX A

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX B

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR ALABAMA 07/22/76

LAKE CODE 0101 HANKHEAD LAKE

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 10334.1

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
0101A1	38.1	0.510	0.534	0.368	0.368	0.142	0.054	0.074	0.034	0.045	0.014	0.076	0.170	0.197
0101B1	40.1	0.534	0.566	0.388	0.388	0.150	0.057	0.076	0.037	0.048	0.015	0.079	0.178	0.208
0101C1	647.5	21.24	23.45	18.55	18.55	10.99	6.42	12.50	5.61	6.34	3.99	8.30	14.64	12.55
0101D1	3061.4	105.90	120.91	126.46	82.40	44.46	12.71	16.36	9.37	9.71	7.70	37.10	81.45	52.52
0101E1	888.4	11.41	13.73	9.20	9.20	4.11	1.64	2.10	0.29	1.37	0.51	2.24	6.34	5.16
0101F1	5161.9	205.86	237.01	227.38	159.14	76.17	33.41	46.16	29.45	16.37	14.63	52.39	119.50	101.08
0101G1	10334.1	334.14	407.76	444.57	314.32	127.43	63.71	68.81	50.97	37.38	40.78	88.93	181.79	176.60
0101Z2	497.3	18.15	21.15	14.38	14.24	6.03	2.55	3.31	1.59	2.12	0.76	3.48	9.74	8.05

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 10334.1
SUM OF SUB-DRAINAGE AREAS = 10334.6

TOTAL FLOW IN = 2172.33
TOTAL FLOW OUT = 2158.59

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
0101A1	3	73	0.963	3	0.963				
	4	73	0.637	2	1.133				
	5	73	0.181	4	0.153				
	6	73	0.178	3	0.113				
	7	73	0.212	8	0.093				
	8	73	0.042	3	0.057				
	9	73	0.020	7	0.021				
	10	73	0.017	7	0.026				
	11	73	0.159	4	0.013				
	12	73	0.651	9	0.091				
	1	74	1.189	6	2.240	21	0.450		
	2	74	0.793	3	0.479	15	1.019		
0101H1	3	73	1.014	3	1.014				
	4	73	0.671	2	1.195				
	5	73	0.190	4	0.161				
	6	73	0.174	3	0.119				
	7	73	0.224	8	0.099				
	8	73	0.045	3	0.059				
	9	73	0.023	7	0.054				
	10	73	0.018	7	0.026				
	11	73	0.167	4	0.013				
	12	73	0.688	9	0.091				
	1	74	1.254	6	2.240	21	0.495		
	2	74	0.835	3	0.479	15	1.076		

TRIBUTARY FLOW INFORMATION FOR ALABAMA 07/22/76

LAKE CODE 0101 HANKHEAD LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
0101C1	3	73	34.263	3	34.263				
	4	73	25.768	7	25.882				
	5	73	12.205	3	14.158				
	6	73	12.205	2	12.686				
	7	73	13.649	11	21.464				
	8	73	6.145	11	6.343				
	9	73	4.446	11	3.964				
	10	73	4.276	4	10.704				
	11	73	11.723	10	11.242				
	12	73	26.844	8	8.891				
	1	74	41.512	5	32.961	19	21.464		
	2	74	29.338	3	20.530	15	35.651		
0101J1	3	73	163.955	3	58.333				
	4	73	202.182	7	111.852				
	5	73	120.913	3	74.190				
	6	73	65.129	2	68.244				
	7	73	26.448	11	36.529				
	8	73	8.042	11	12.743				
	9	73	4.361	11	3.341				
	10	73	4.361	4	6.003				
	11	73	8.042	10	3.002				
	12	73	75.323	8	16.056				
	1	74	179.529	5	150.929	19	80.986		
	2	74	158.574	9	153.760	17	264.196		
0101E1	3	73	23.220	3	23.135				
	4	73	15.574	7	15.688				
	5	73	4.757	9	3.879				
	6	73	4.757	14	8.580				
	7	73	5.805	10	2.973				
	8	73	1.345	17	1.209				
	9	73	0.680	9	0.671				
	10	73	0.597	14	0.374				
	11	73	4.474	10	4.141				
	12	73	17.188	9	2.390				
	1	74	28.373	14	15.688	30	26.136		
	2	74	14.425	12	9.854	28	7.929		
0101F1	3	73	363.985	3	111.172				
	4	73	300.158	7	303.613				
	5	73	245.507	9	309.786				
	6	73	96.569	14	97.127				
	7	73	33.980	10	22.092				
	8	73	9.033	17	11.248				
	9	73	3.398	9	3.398				
	10	73	2.764	14	2.427				
	11	73	7.334	10	2.257				
	12	73	203.598	9	10.137				
	1	74	385.164	14	271.558	30	345.465		
	2	74	365.287	17	154.610	28	134.186		

TRIBUTARY FLOW INFORMATION FOR ALABAMA 07/22/76

LAKE CODE 0101 BANKHEAD LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
0101G1	3	73	586.159	4	217.473				
	4	73	560.674	8	736.238				
	5	73	305.823	7	256.267				
	6	73	211.527	13	68.810				
	7	73	179.246	8	34.263				
	8	73	102.224	3	121.762				
	9	73	54.085	7	56.634				
	10	73	30.299	7	12.176				
	11	73	40.776	4	11.044				
	12	73	317.149	9	36.529				
	1	74	622.970	6	419.089	21	433.416		
	2	74	603.149	3	540.852	15	596.353		
0101ZZ	3	73	35.679	3	35.396				
	4	73	24.239	2	40.443	7	24.352		
	5	73	7.221	3	8.325	4	6.626	9	6.031
	6	73	7.221	2	7.872	3	4.899	14	5.975
	7	73	8.891	8	5.340	10	4.502	11	18.491
	8	73	2.067	3	2.662	11	2.057	17	1.784
	9	73	0.991	7	0.821	9	0.708	11	0.765
	10	73	0.623	4	1.076	7	0.708	14	0.566
	11	73	6.853	4	0.651	10	6.246		
	12	73	25.542	8	4.134	9	3.794		
	1	74	44.174	5	34.263	6	56.634	14	24.466
	1	74	44.174	19	18.038	21	31.149	30	40.210
	2	74	29.450	3	17.273	9	33.980	12	15.319
	2	74	29.450	15	37.378	17	42.475	28	12.063

TRIBUTARY FLOW INFORMATION FOR ALABAMA 07/22/76

LAKE CODE 0105 HOLT LOCK & DAM

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 10960.9

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
0105A1	10334.1	334.14	407.76	444.57	314.32	141.30	63.71	68.81	50.97	37.38	40.78	86.93	181.79	179.78
0105A2	10960.3	353.96	433.25	470.06	334.14	149.80	76.74	73.06	53.80	39.64	43.04	92.31	192.84	191.37
0105B1	5.4	0.193	0.231	0.157	0.156	0.066	0.028	0.036	0.017	0.023	0.008	0.038	0.106	0.088
0105C1	4.7	0.170	0.198	0.135	0.133	0.057	0.024	0.031	0.015	0.020	0.007	0.033	0.091	0.075
0105D1	24.0	1.059	1.235	0.838	0.830	0.351	0.149	0.193	0.092	0.124	0.044	0.203	0.566	0.469
0105E1	224.3	8.14	9.54	6.48	6.43	2.72	1.15	1.50	0.71	0.98	0.34	1.57	4.39	3.63
0105F1	96.9	3.54	4.11	2.79	2.78	1.18	4.98	6.46	0.31	4.13	0.15	0.68	1.89	2.73
0105Z2	266.8	9.74	11.36	7.70	7.65	3.23	1.36	1.76	0.85	1.13	0.40	1.87	5.21	4.31

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 10960.9
SUM OF SUB-DRAINAGE AREAS = 10961.1

TOTAL FLOW IN = 2309.33
TOTAL FLOW OUT = 2312.64

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
0105A1	3	73	588.990	4	217.473				
	4	73	560.674	8	736.238				
	5	73	305.822	7	256.267				
	6	73	211.527	3	68.813				
	7	73	173.246	8	34.263				
	8	73	102.224	3	121.762				
	9	73	54.045	7	56.634				
	10	73	30.249	7	12.176				
	11	73	40.776	4	11.044				
	12	73	317.149	9	36.529				
	1	74	622.973	6	419.089	21	430.416		
	2	74	603.149	3	540.852	15	597.485		
0105A2	3	73	651.287	4	250.847				
	4	73	615.325	11	506.871				
	5	73	336.121	7	314.317	31	399.267		
	6	73	231.065	28	224.269				
	7	73	195.183						
	8	73	107.604	1	134.505				
	9	73	59.465	1	14.547				
	10	73	34.547	2	15.291				
	11	73	44.554	7	9.911				
	12	73	332.803	9	5.663				
	1	74	682.436	12	1144.030	26	756.060		
	2	74	634.297	12	362.456	28	379.446		

15

TRIBUTARY FLOW INFORMATION FOR ALABAMA 07/22/76

LAKE CODE 0105 WILT LOCK & DAM

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
010541	3	73	0.391	4	0.334				
	4	73	0.265	11	0.116				
	5	73	0.079	7	0.053	31	0.0.0		
	6	73	0.079	28	0.0				
	7	73	0.097						
	8	73	0.016	1	0.052				
	9	73	0.004	1	0.019				
	10	73	0.004	2	0.0				
	11	73	0.075	7	0.0				
	12	73	0.279	11	0.034				
	1	74	0.481	12	0.472	26	0.957		
	2	74	0.323	12	0.167	28	0.133		
010561	3	73	0.334	4	0.246				
	4	73	0.227	11	0.089				
	5	73	0.068	7	0.045	31	0.052		
	6	73	0.068	28	0.0				
	7	73	0.084						
	8	73	0.014	1	0.045				
	9	73	0.004	1	0.016				
	10	73	0.003	2	0.0				
	11	73	0.064	7	0.0				
	12	73	0.240	11	0.028				
	1	74	0.413	12	0.748	26	0.399		
	2	74	0.278	12	0.142	28	0.113		
010581	3	73	2.078						
	4	73	1.416	11	0.617				
	5	73	0.423	7	0.283	31	0.320		
	6	73	0.422	28	0.051				
	7	73	0.521						
	8	73	0.086	1	0.279				
	9	73	0.022	1	0.101				
	10	73	0.019	2	0.079				
	11	73	0.399	7	0.013				
	12	73	1.489	11	0.178				
	1	74	2.577	9	3.030	12	0.644		
	2	74	1.727	12	0.895	28	0.685		
010961	3	73	10.279						
	4	73	6.853	11	4.219				
	5	73	2.206	7	2.044	31	1.348		
	6	73	6.116	28	1.812				
	7	73	3.879						
	8	73	1.274	1	1.741				
	9	73	1.201	1	0.464				
	10	73	1.252	2	5.125				
	11	73	2.113	7	0.269				
	12	73	7.362	11	1.005				
	1	74	12.261	12	20.441	26	11.740		
	2	74	4.580	12	4.531	28	1.716		

TRIBUTARY FLOW INFORMATION FOR ALABAMA 07/22/76

LAKE CODE 0105 HOLT LOCK & DAM

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
0105F1	3	73	6.934						
	4	73	4.417	8	6.220				
	5	73	1.407	4	1.218				
	6	73	1.407	3	0.954				
	7	73	1.736	8	1.036				
	8	73	0.286	3	0.445				
	9	73	0.074	7	0.053				
	10	73	0.032	7	0.026				
	11	73	1.334	4	0.035				
	12	73	4.984	9	0.739				
	1	74	8.580	6	11.185	21	6.088		
	2	74	7.306	12	2.973	15	7.306		
0105Z2	3	73	19.114	4	16.367				
	4	73	12.997	8	17.188	11	5.663		
	5	73	3.879	7	2.577	31	2.945		
	6	73	3.879	3	2.633	28	0.793		
	7	73	4.785	8	2.888				
	8	73	1.104	1	2.577	3	1.416		
	9	73	0.538	1	1.189	7	0.425		
	10	73	0.340	2	1.048	7	0.368		
	11	73	3.681	4	0.368	7	0.396		
	12	73	13.705	9	2.039	11	1.642		
	1	74	23.673	6	30.582	9	28.034	12	42.758
	1	74	23.673	21	16.764	26	22.904		
	2	74	15.857	3	9.260	12	8.212	15	20.105
	2	74	15.857	26	9.061	28	6.456		

APPENDIX C

PHYSICAL AND CHEMICAL DATA

STORET RETRIEVAL DATE 76/07/22

010101
33 15 50.0 087 21 05.0 3
MARSHEAD LAKE
01125 ALABAMA
033991

TIEMALES 2111202
0062 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00394 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/08	10	40 0000	23.9		30	130	6.70	17	0.170	0.600	0.540	0.007
	10	40 0006	23.6	6.4		123	6.70	18	0.160	0.500	0.530	0.008
	10	40 0015	22.8	5.2		120	6.71	16	0.240	0.500	0.580	0.014
	10	40 0030	21.5	4.8		115	6.75	17	0.210	0.500	0.540	0.017
	10	40 0045	20.3	4.0		105	6.50	14	0.040	0.500	0.720	0.016
	10	40 0058	20.1	3.6		105	6.60	17	0.270	0.500	0.500	0.012
73/08/29	14	10 0000	28.8		90	252	7.03	33	0.490	1.500	0.780	0.006
	14	10 0005	28.6	5.2		244	6.90	32	0.480	1.100	0.780	0.007
	14	10 0015	28.3	4.8		237	6.80	31	0.480	1.200	0.800	0.005
	14	10 0025	27.0	2.6		217	6.70	30	0.520	1.100	0.770	0.006
	14	10 0035	24.7	0.6		170	6.70	27	0.580	1.200	0.690	0.006
	14	10 0050	22.3	0.8		96	6.60	22	0.380	0.500	0.330	0.005
73/10/30	15	35 0000	22.4		72	190	6.70	26	0.450	0.900	1.100	0.013
	15	35 0005	22.4	1.6		191	6.60	26	0.480	0.800	1.120	0.006
	15	35 0015	22.4	1.6		191	6.50	25	0.480	0.800	1.140	0.005
	15	35 0030	22.4	1.4		191	6.50	25	0.470	0.700	1.120	0.005
	15	35 0055	22.4	1.8		191	6.50	24	0.480	0.800	1.120	0.005

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/08	10	40 0000	0.054	2.1
	10	40 0006	0.060	
	10	40 0015	0.066	
	10	40 0030	0.070	
	10	40 0045	0.072	
	10	40 0058	0.082	
73/08/29	14	10 0000	0.012	4.6
	14	10 0005	0.011	
	14	10 0015	0.010	
	14	10 0025	0.010	
	14	10 0035	0.011	
	14	10 0050	0.008	
73/10/30	15	35 0000	0.016	1.0
	15	35 0005	0.011	
	15	35 0015	0.004	
	15	35 0030	0.004	
	15	35 0055	0.011	

STORET RETRIEVAL DATE 76/07/22

010102
33 30 45.0 087 15 02.0 3
BANKHEAD LAKE
01073 ALABAMA

033991

11PALES 2111202
0070 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/08	13 10	0000	25.8		35	155	6.70	23	0.460	1.400	0.470	0.009
	13 10	0006	25.1	6.9		180	6.70	24	0.560	1.100	0.510	0.003
	13 10	0015	23.8	5.4		300	6.70	34	1.470	1.800	0.700	0.003
	13 10	0030	22.8	4.1		375	6.70	44	1.920	2.600	0.790	0.002
	13 10	0042	20.9	4.1		220	6.70	29	0.890	1.300	0.570	0.004
	13 10	0055	20.3	4.2		145	6.70	21	0.440	0.800	0.440	0.007
	13 10	0066	20.2	4.5		123	6.70	18	0.360	0.600	0.020	0.032
73/08/24	13 30	0000	30.7		65	186	7.00	28	0.210	1.200	0.430	0.007
	13 30	0005	29.0	6.0		184	6.90	29	0.220	0.800	0.450	0.006
	13 30	0015	28.5	3.4		194	6.80	30	0.330	0.900	0.480	0.006
	13 30	0025	27.1	1.8		235	6.60	38	0.620	1.500	0.600	0.006
	13 30	0035	24.0	0.5		200	6.60	31	0.940	1.700	0.530	0.004
	13 30	0050	22.9	0.1		120	6.50	26	0.530	1.200	0.340	0.005
	13 30	0065	22.3	0.2		120	6.50	27	0.570	1.100	0.260	0.005
73/10/30	15 00	0000	21.4		60	224	6.80	34	0.780	1.300	1.140	0.006
	16 00	0013	21.4	4.8		227	6.80	33	0.760	1.200	0.990	0.005
	16 00	0025	21.4	4.8		228	6.80	34	0.750	1.300	1.120	0.005

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/08	13 10	0000	0.038	1.2
	13 10	0006	0.040	
	13 10	0015	0.034	
	13 10	0030	0.023	
	13 10	0042	0.023	
	13 10	0055	0.024	
	13 10	0066	0.038	
73/08/24	13 30	0000	0.027	4.5
	13 30	0005	0.025	
	13 30	0015	0.018	
	13 30	0025	0.011	
	13 30	0035	0.020	
	13 30	0050	0.018	
	13 30	0065	0.023	
73/10/30	15 00	0000	0.017	3.1
	16 00	0013	0.018	
	16 00	0025	0.017	

STORET RETRIEVAL DATE 76/07/22

010103
33 33 30.0 087 11 05.0 3
BANKHEAD LAKE
01073 ALABAMA
033991

11EPALES 2111202
0039 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/08	14 10	0000	25.6		30	125	6.60	20	0.110	0.700	0.410	0.005
	14 10	0006	24.1	7.4		75	6.60	15	0.050	0.500	0.340	0.006
	14 10	0015	24.0	7.2		80	6.60	16	0.070	0.600	0.350	0.004
	14 10	0025	23.6	7.2		100	6.60	17	0.090	0.600	0.390	0.004
	14 10	0035	19.8	5.8		78	6.60	13	0.100	0.600	0.370	0.005
73/08/25	16 30	0000	30.2		48	95	7.00	16	0.060	0.700	0.240	0.005
	16 30	0005	29.3	6.3		140	6.70	22	0.100	0.600	0.330	0.009
	16 30	0015	27.7	3.6		271	6.70	48	0.350	1.100	0.710	0.008
	16 30	0030	22.8	1.8		74	6.40	15	0.150	0.700	0.270	0.007
73/10/30	16 15	0000	22.3		48	150	6.90	29	0.230	0.600	0.540	0.006
	16 15	0010	22.1	6.4		149	6.90	28	0.210	0.500	0.510	0.005
	16 15	0023	21.7	5.8		162	6.80	30	0.320	0.500	0.550	0.008

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/08	14 10	0000	0.360	4.8
	14 10	0006	0.040	
	14 10	0015	0.031	
	14 10	0025	0.034	
	14 10	0035	0.045	
73/08/25	16 30	0000	0.030	7.2
	16 30	0005	0.029	
	16 30	0015	0.028	
	16 30	0030	0.025	
73/10/30	16 15	0000	0.031	5.4
	16 15	0010	0.028	
	16 15	0023	0.029	

STORET RETRIEVAL DATE 75/07/22

010104
33 38 45.0 087 12 30.0 3
WAYNEHEAD LAKE
01127 ALABAMA

033991

TIEPALES 2111202
0036 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/04	15 10	0000	23.8		24	80	6.10	14	0.140	0.700	0.480	0.016
	15 10	0006	21.3	7.2		70	6.30	18	0.090	0.300	0.480	0.012
	15 10	0015	17.6	8.0		60	6.40	15	0.100	0.300	0.460	0.013
	15 10	0023	16.9	7.0		60	6.40	14	0.090	0.300	0.440	0.012
	15 10	0032	16.8	7.4		60	6.50	17	0.120	0.300	0.440	0.012
73/08/25	16 05	0000	30.7		24	70	6.60	12	0.070	0.800	0.330	0.009
	16 05	0005	29.4	5.6		69	6.40	11	0.040	0.600	0.320	0.008
	16 05	0012	28.2	5.4		65	6.30	12	0.050	0.600	0.310	0.008
	16 05	0020	22.3	7.2		53	6.30	11	0.050	0.500	0.320	0.017
	16 05	0027	21.3	4.7		55	6.20	12	0.050	0.600	0.320	0.009
73/12/30	16 30	0000	24.9		42	162	6.80	26	0.150	0.500	0.600	0.015
	16 30	0005	29.8	3.2		163	6.70	26	0.140	0.200	0.600	0.014
	16 30	0010	27.5	2.8		155	6.60	25	0.130	0.300	0.630	0.013
	16 30	0020	22.9	0.8		223	6.60	36	0.270	0.400	0.850	0.009
	16 30	0031	22.4	1.0		209	6.60	35	0.290	0.500	0.900	0.008

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/04	15 10	0000	0.049	3.6
	15 10	0006	0.054	
	15 10	0015	0.050	
	15 10	0023	0.046	
	15 10	0032	0.064	
73/08/25	16 05	0000	0.035	3.6
	16 05	0005	0.028	
	16 05	0012	0.029	
	16 05	0020	0.035	
	16 05	0027	0.042	
73/12/30	16 30	0000	0.042	1.1
	16 30	0005	0.037	
	16 30	0010	0.030	
	16 30	0020	0.025	
	16 30	0031	0.026	

STORET RETRIEVAL DATE 76/07/22

010501
33 12 45.0 087 34 50.0 3
HOLT LOCK AND DAM
01125 ALABAMA

033992

11EPALES 2111202
0040 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	01077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/07	11	00 0000	23.1		34	160	6.90	23	0.240	0.500	0.720	0.009
	11	00 0006	23.0	7.4		160	6.90	21	0.230	0.400	0.730	0.011
	11	00 0015	23.0	6.0		160	6.90	21	0.210	0.400	0.730	0.010
	11	00 0025	23.0	6.0		160	6.90	22	0.210	0.400	0.710	0.008
	11	00 0036	23.0	6.0		160	6.90	19	0.210	0.400	0.700	0.009
73/08/29	15	30 0000	28.3		59	176	6.50	21	0.080	0.400	0.740	0.004
	15	30 0005	28.2	4.2		175	6.50	22	0.080	0.300	0.740	0.004
	15	30 0015	28.2	4.8		174	6.50	16	0.070	0.300	0.720	0.005
	15	30 0034	28.2	4.5		175	6.50	18	0.080	0.300	0.740	0.004
73/10/31	16	05 0000	20.8		72	161	6.90	21	0.120	0.500	0.700	0.008
	16	05 0005	20.8	4.6		161	6.80	20	0.120	0.400	0.680	0.008
	16	05 0015	20.9	4.6		161	6.80	22	0.120	0.300	0.690	0.006
	16	05 0033	20.8	4.6		159	6.80	20	0.120	0.300	0.690	0.006

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/07	11	00 0000	0.033	2.2
	11	00 0006	0.033	
	11	00 0015	0.034	
	11	00 0025	0.034	
	11	00 0036	0.029	
73/08/29	15	30 0000	0.054	2.6
	15	30 0005	0.057	
	15	30 0015	0.064	
	15	30 0034	0.064	
73/10/31	16	05 0000	0.022	2.3
	16	05 0005	0.021	
	16	05 0015	0.022	
	16	05 0033	0.024	

STORET RETRIEVAL DATE 76/01/22

010502
33 15 55.0 087 30 45.0 3
MOLT LOCK AND DAM
01125 ALABAMA

033992

TENNESSEE 2111202
0024 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00024 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/07	11 45	0000	23.4		24	205	6.40	32	0.300	0.700	0.690	0.023
	11 45	0006	23.4	5.4		205	6.40	32	0.260	0.500	0.640	0.008
	11 45	0013	24.0	5.0		190	6.90	22	0.210	0.400	0.280	0.006
	11 45	0020	23.1	5.8		160	6.90	25	0.250	0.400	0.720	0.008
73/08/24	15 15	0000	28.0		54	174	6.60	20	0.070	0.300	0.740	0.003
	15 15	0005	28.0	4.8		172	6.50	21	0.060	0.200	0.730	0.003
	15 15	0015	27.7	5.0		175	6.50	20	0.070	0.300	0.740	0.004
73/10/31	15 42	0000	21.1		64	155	6.40	21	0.070	0.200	0.780	0.004
	15 42	0005	21.1	7.4		155	6.90	20	0.060	0.200K	0.760	0.004
	15 42	0015	21.0	7.0		154	6.80	19	0.070	0.400	0.750	0.007
	15 42	0025	19.3	7.8		126	6.80	10	0.040	0.300	0.600	0.005

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/07	11 45	0000	0.047	2.6
	11 45	0006	0.051	
	11 45	0013	0.034	
	11 45	0020	0.043	
73/08/24	15 15	0000	0.006	2.2
	15 15	0005	0.007	
	15 15	0015	0.009	
73/10/31	15 42	0000	0.013	0.7
	15 42	0005	0.014	
	15 42	0015	0.015	
	15 42	0025	0.018	

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 78/07/22

010503
33 17 00.0 087 24 10.0 3
HOLT LOCK AND DAM
01125 ALABAMA
033991

TIEPALES 2111202
0063 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	38077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/07	12 30	0000	24.5		26	160	6.40	22	0.140	0.600	0.630	0.010
	12 30	0006	24.1	6.8		150	6.40	20	0.160	0.400	0.630	0.006
	12 30	0015	23.4	7.0		140	6.40	18	0.230	0.300	0.630	0.012
	12 30	0030	22.4	5.0		125	6.40	17	0.230	0.300	0.650	0.014
	12 30	0045	21.9	4.8		125	6.40	14	0.210	0.300	0.610	0.017
	12 30	0059	21.8	4.8		130	6.80	14	0.230	0.400	0.660	0.017
73/06/29	15 40	0000	29.7		60	187	6.80	20	0.250	0.400	0.620	0.004
	15 40	0005	28.3	5.0		182	6.60	19	0.230	0.500	0.620	0.004
	15 40	0015	28.1	4.6		140	6.50	23	0.260	0.500	0.630	0.006
	15 40	0035	27.3	3.2		178	6.50	24	0.200	0.400	0.730	0.005
	15 40	0050	26.7	2.0		173	6.40	23	0.070	0.300	0.860	0.005
73/10/31	14 50	0000	22.0		50	164		21	0.030	0.300	0.920	0.007
	14 50	0005	22.0	6.2		164		20	0.020	0.200	0.940	0.005
	14 50	0015	22.1	6.0		164		22	0.020	1.200	0.940	0.005
	14 50	0030	22.1	6.0		162		20	0.020	0.200	0.930	0.006
	14 50	0053	22.1	6.0		162		18	0.020	0.200K	0.930	0.009

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/07	12 30	0000	0.053	2.7
	12 30	0006	0.052	
	12 30	0015	0.057	
	12 30	0030	0.054	
	12 30	0045	0.060	
	12 30	0059	0.056	
73/06/29	15 40	0000	0.010	3.6
	15 40	0005	0.007	
	15 40	0015	0.009	
	15 40	0035	0.004	
	15 40	0050	0.007	
73/10/31	14 50	0000	0.010	1.3
	14 50	0005	0.013	
	14 50	0015	0.022	
	14 50	0030	0.015	
	14 50	0053	0.015	

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 74/07/22

010504
33 15 15.0 087 26 05.0 3
COOSA LOCK AND DAM
01125 ALABAMA

033941

FEMALES
0074 FEET DEPTH CLASS 00
21112U2

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/04	04 45	0000	24.1		20	150	6.80	20	0.120	0.400	0.610	0.004
	04 45	0005	24.0	6.4		145	6.70	19	0.130	0.400	0.620	0.006
	04 45	0015	23.5	6.2		145	6.70	22	0.140	0.300	0.640	0.011
	04 45	0030	22.7	5.2		140	6.70	19	0.140	0.300	0.640	0.010
	04 45	0045	22.2	4.8		135	6.70	19	0.130	0.300	0.640	0.010
	04 45	0060	22.1	4.2		135	6.60	27	0.130	0.300	0.660	0.010
	04 45	0074	22.0	4.2		135	6.60	27	0.130	0.300	0.660	0.014
73/06/24	14 40	0000	29.4		70	177	6.80	21	0.200	0.600	0.640	0.005
	14 40	0005	28.8	6.4		178	6.80	18	0.170	0.400	0.680	0.005
	14 40	0015	28.2	6.8		174	6.70	20	0.140	0.500	0.620	0.009
	14 40	0030	27.0	3.6		176	6.53	20	0.120	0.300	0.700	0.006
	14 40	0045	27.0	2.2		172	6.53	20	0.070	0.200	0.480	0.006
	14 40	0070	26.5	1.4		168	6.40	23	0.040	0.200	0.740	0.005
73/10/31	15 20	0000	22.3		54	162	6.40	18	0.030	0.200	0.820	0.005
	15 20	0005	22.4	6.0		163	6.50	18	0.030	0.200<	0.820	0.008
	15 20	0015	22.3	6.0		162	6.40	19	0.030	0.200<	0.820	0.006
	15 20	0035	22.4	6.2		161	6.46	20	0.030	0.200	0.810	0.006
	15 20	0065	22.3	6.0		165	6.40	21	0.030	0.200<	0.810	0.005

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/04	04 45	0000	0.044	3.4
	04 45	0005	0.037	
	04 45	0015	0.042	
	04 45	0030	0.044	
	04 45	0045	0.046	
	04 45	0060	0.047	
	04 45	0074	0.050	
73/06/24	14 40	0000	0.036	3.7
	14 40	0005	0.010	
	14 40	0015	0.009	
	14 40	0030	0.004	
	14 40	0045	0.007	
	14 40	0070	0.007	
73/10/31	15 20	0000	0.015	0.9
	15 20	0005	0.014	
	15 20	0015	0.015	
	15 20	0035	0.016	
	15 20	0065	0.015	

< VALUE KNOWN TO BE
LESS THAN INDICATED

APPENDIX D

TRIBUTARY AND WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 74/01/22

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO3+NO2 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/03	08	30	0.028	0.980	0.034	0.021	0.055
73/04/02	11	05	0.046	1.980	0.070	0.005K	0.020
73/05/04	10	25	0.020	0.440	0.016	0.005K	0.015
73/06/03	08	25	0.030	0.175	0.020	0.007	0.020
73/07/04	11	05	0.050	0.250	0.016	0.016	0.040
73/08/03	14	00	0.029	0.140	0.025	0.006	0.020
73/09/07	13	55	0.014	0.190	0.018	0.011	0.020
73/10/07	13	05	0.010K	0.250	0.032	0.005K	0.020
73/11/04	10	30	0.035	0.600	0.022	0.005K	0.015
73/12/04	10	10	0.096	0.100	0.024	0.005K	0.010
74/01/05	09	20	5.100	0.200	0.028	0.005K	0.015
74/01/21	10	50	0.076	0.100	0.032	0.008	0.020
74/02/04	13	10	0.066	0.100K	0.010	0.005	0.005
74/02/18	11	35	0.068	0.200	0.035	0.010	0.030

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 78/07/22

01971 [illegible]
33 34 00.0 087 24 10.0 4
LITTLE YELLOW CREEK
01 [illegible] TUSCALOOSA C
T/MAYMEAD LAKE 033991
CHARME RD BRDG SW OF WHITSON
[illegible] 21112J4
1000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/03	08	40	0.120	0.620	0.044	0.050	0.090
73/04/02	10	55	0.132	2.200	0.094	0.005K	0.010
73/05/04	10	40	0.065	0.780	0.132	0.005K	0.010
73/06/03	08	15	0.076	0.380	0.016	0.011	0.035
73/07/08	11	15	0.026	0.240	0.011	0.006	0.015
73/08/03	14	10	0.060	0.140	0.025	0.007	0.025
73/09/07	14	05	0.010K	0.190	0.010	0.005K	0.020
73/10/07	13	20	0.010K	1.470	0.046	0.005K	0.040
73/11/04	10	45	0.022	0.275	0.075	0.005K	0.027
73/12/09	10	30	0.112	0.400	0.040	0.005K	0.010
74/01/06	09	30	0.384	0.300	0.012	0.005K	0.010
74/01/21	11	00	0.160	0.200	0.024	0.005K	0.010
74/02/03	13	15	0.160	0.100K	0.015	0.010	0.010
74/02/15	11	20	0.112	0.300	0.055	0.005	0.030

K VALUE KNOWN TO BE
LESS THAN INDICATED

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DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO3+NO2 -TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/ 4/03	15	00	0.560	5.200	4.000	0.005K	0.10
74/ 4/07	09	40	0.480	5.900	2.900	0.005K	0.030
74/ 4/04	17	15	1.100	5.600	3.400	0.005K	0.035
74/05/02	15	35	1.080	4.500	3.600	0.010	0.040
74/ 7/11	14	00	0.460	2.630	0.280	0.006	0.020
74/ 7/11	10	45	0.500	0.660	0.390	0.007	0.040
74/ 7/11	06	30	0.460	1.400	0.410	0.005K	0.065
74/ 7/04	11	00	0.540	0.840	0.031	0.005K	0.020
74/11/10	10	20	1.100	2.500	1.600	0.005K	0.095
74/11/08	12	45	0.960	3.700	2.400	0.032	0.210
74/04/05	08	30	0.950	2.000	1.449	0.005K	0.080
74/04/19	07	40	1.000	2.300	1.670	0.005K	0.035
74/ 7/04	10	30	0.590	1.000	0.630	0.005	0.050
74/ 7/17	09	40	0.620	2.530	0.470	0.005	0.180

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/11/22

0101 01 [illegible]
33 34 30.0 087 09 30.0 4
LOCUST FORK(BLACK WARRIOR RIVER)
01 MAP JEFFERSON CO
TARRANT [illegible] 03394
MARINE AREA NEAR MCG OF MARINE
11 SALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO3&NO2 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/04	16 45		0.930	2.500	0.650	0.012	0.055
73/04/07	08 50		0.730	4.400	0.320	0.006	0.030
73/05/03	17 40		0.690	3.570	0.252	0.007	0.050
73/06/02	16 30		0.550	2.000	0.220	0.016	0.055
73/07/11	18 10		1.260	0.690	0.252	0.056	0.115
73/08/11	09 45		1.600	1.000	0.560	0.020	0.060
73/09/11	10 55		1.420	0.730	0.066	0.008	0.035
73/10/04	20 00		0.730	5.100	3.600	0.690	0.800
73/11/10	08 50		2.300	2.300	1.100	0.138	0.230
73/12/08	13 00		0.930	1.800	1.260	0.168	0.260
74/01/05	09 45		1.090	0.500	0.160	0.012	0.080
74/01/19	09 10		1.780	0.900	0.193	0.010	0.055
74/02/04	09 30		0.760	1.000	0.190	0.015	0.090
74/02/17	11 10		0.830	1.400	0.320	0.015	0.160

STORET RETRIEVAL DATE 74/07/22

[illegible]

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/ 1/03	12 20		0.370	1.200	0.053	0.005R	0.020
73/04/07	13 45		0.440	0.600	0.067	0.005R	0.025
73/05/04	09 35		0.290	0.370	0.037	0.013	0.020
73/06/14	14 43		0.399	0.370	0.030	0.008	0.030
73/07/10	11 15		0.088	1.200	0.072	0.008	0.020
73/08/17	09 15		0.060	1.050	0.040	0.005R	0.025
73/09/20	11 15		0.667	0.580	0.028	0.005R	0.025
73/10/16	11 15		0.138	1.180	0.093	0.005R	0.025
73/11/13	11 50		0.600	1.100	0.044	0.008	0.030
73/12/04	11 50		0.504	0.400	0.048	0.005R	0.035
74/ 1/14	11 45		0.312	0.400	0.036	0.016	0.105
74/02/18	13 15		0.250	0.500	0.032	0.005	0.040
74/03/12	11 45		0.368	0.500	0.055	0.010	0.020
74/04/23	11 10		0.276	0.850	0.100	0.005R	0.037

R VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/07/22

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 01013                    45010101
33 39 30.0 089 10 30.0 4
MULBERRY FORK(BLACK WARRIOR RVR)
01       MAP WALKER CO
I/HANKHEAD LAKE                  033991
COPELAND FERRY BRDG 6 MI S OF CORDOVA
ILEVALES                      2111204
 0000 FEET  DEPTH  CLASS 00
```

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/04	11 45		0.280	1.890	0.120	0.005K	0.015
73/04/07	13 00		0.320	1.000	0.066	0.011	0.045
73/05/09	09 15		0.420	0.180	0.033	0.018	0.030
73/06/14	14 25		0.315	0.600	0.034	0.028	0.135
73/07/10	11 00		0.340	0.340	0.034	0.015	0.050
73/08/17	09 00		0.280	1.100	0.043	0.005K	0.035
73/09/09	11 20		0.210	0.660	0.027	0.005K	0.030
73/10/14	11 30		0.147	0.900	0.140	0.007	0.040
73/11/10	12 05		0.660	0.450	0.044	0.007	0.045
73/12/04	11 10		0.449	0.500	0.052	0.008	0.065
74/01/14	11 30		0.660	0.400	0.040	0.020	0.095
74/01/30	13 20		0.490	0.300	0.028	0.012	0.065
74/02/12	11 20		0.672	0.100K	0.030	0.015	0.025
74/02/28	11 20		0.552	0.100	0.030	0.005	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 74/07/22

01011 L2010101
33 27 30.0 087 21 30.0 4
BLACK WARRIOR RIVER
01 JEFF TUSCALOOSA C
0/HANKHEAD LAKE 033941
LOCK 17 2.4 MI NW OF PATTONS MILL
11FMALES 2111234
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO3+NO2 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/03	09 15		0.510	1.400	0.251	0.005K	0.015
73/04/02	10 09		0.294	2.100	0.240	0.016	0.125
73/05/04	11 10		0.450	3.100	0.265	0.013	0.040
73/09/04	09 15		0.530	0.730	0.168	0.033	0.100
73/07/04	11 55		0.650	0.520	0.240	0.005K	0.020
73/08/04	14 40		0.500	0.810	0.205	0.005K	0.015
73/09/07	14 35		0.550	0.660	0.460	0.005K	0.015
73/10/07	13 50		0.640	0.990	0.640	0.005K	0.015
73/11/04	13 25		1.440	0.700	0.084	0.005K	0.010
73/12/04	10 45		2.520	0.300	0.026	0.005K	0.010
74/01/08	10 10		0.810	0.500	0.132	0.012	0.060
74/02/21	14 40		0.720	0.200	0.138	0.008	0.025
74/03/03	14 40		0.588	0.200	0.100	0.010	0.035
74/04/15	11 05		0.560	0.400	0.095	0.010	0.050

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/07/22

01010CA PR0101CA P100000
33 24 05.0 086 58 00.0 4
VALLEY CREEK (BESSEMER)
01 JEFFERSON CO HWY
T/HANKHEAD LAKE 033992
VALLEY CREEK
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/03/29	08 00								
CP(T)-			0.105	7.400	0.140	2.000	3.800	15.000	15.000
73/03/30	08 00								
73/04/28	00 00								
CP(T)-			0.580	7.900	0.220	1.500	3.900	15.000	15.000
73/04/28	24 00								
73/05/24	08 00								
CP(T)-			0.240	13.000	11.200	5.600	6.000	15.000	15.000
73/05/25	08 00								
73/06/28	08 00								
CP(T)-			0.230	11.000	0.440	2.300	5.000	15.000	15.000
73/06/29	08 00								
73/07/28			0.050	11.000	0.030	4.150	6.000	15.000	15.000
73/08/21	00 00								
CP(T)-				16.000		6.300	8.100	15.000	15.000
73/08/21	24 00								
73/09/21			0.250	8.000	2.32[illegible]	5.000	6.150	15.000	15.000
73/10/30	12 00								
CP(T)-			0.240	21.000	7.000	7.200	9.400	15.000	15.500
73/10/31	12 00								
73/11/29	12 00								
CP(T)-			0.460	9.200	0.094	2.100	4.300	15.000	15.000
73/11/30	12 00								
73/12/27	12 00								
CP(T)-			2.310	4.300	0.084	0.960	2.500	14.200	13.000
73/12/28	12 00								
74/01/30	12 00								
CP(T)-			0.490	6.400	0.220	1.600	3.500	13.500	15.000
74/01/31	12 00								
74/02/25	12 00								
CP(T)-			0.360	7.100	0.085	2.100	3.600	16.300	15.700
74/02/26	12 00								

64

STORET RETRIEVAL DATE 76/07/22

01010A AS01010A P001500
33 46 20.0 086 48 40.0 4
TURKEY CREEK (KIMBERLEY)
01 JEFFERSON CO HWY
T/BANKHEAD LAKE 033991
TURKEY CR/LOCUST FK BLACK WARRIOR RIVER
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/08/01 CP(T)- 73/08/01	08 00 16 00		0.150	1.100	0.076	0.445	0.542	0.087	0.088
73/09/01 CP(T)- 73/09/01	08 00 16 00			6.000		0.840	1.370		
73/10/02 CP(T)- 73/10/02	00 00 08 00		0.340	10.500	0.036	1.000	1.450		
73/12/03 CP(T)- 73/12/03	08 00 16 00		3.300	1.700	0.032	2.520	2.600	0.150	
74/01/03	14 00		2.600	3.000	0.040K	2.800	3.200	0.200	
74/02/01 CP(T)- 74/02/01	08 00 14 00		1.280	1.900	0.040K	1.200	1.450	0.700	
74/02/28 CP(T)- 74/02/28	08 00 14 00		2.700	1.000K	0.091	1.600	1.950	0.600	
74/04/02	15 00		2.520	1.000K	0.130	2.300	2.500	0.200	
74/05/09	11 00		1.262	1.600	0.010	1.050	1.600	0.461	0.463
74/06/04	11 00		0.800	1.100	0.130	1.550	1.850	0.425	0.380
74/07/08	15 00		0.640	4.300	0.220	0.390	0.630	0.200	0.210
74/08/05	14 30		0.960	2.200	0.070	0.560	0.560	0.180	0.174
74/09/03	11 00		0.520	2.200	0.075	0.790	0.900	0.180	0.195

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 74/07/22

01010M P01010M P010000*
33 35 30.0 086 48 30.0 4
FIVE MILE CREEK (BIRMINGHAM)
01 JEFFERSON CO HWY
T/HANKHEAD LAKE 033992
FIVE MILE CREEK
11EMALES 2161204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO3&NO2 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/03/30 00 00									
CMIT)-			0.350	6.600	3.115	0.750	2.100		
73/03/31 24 00									
73/04/25 00 00									
CMIT)-			0.735	6.330	0.189	0.900	2.200		
73/04/25 24 00									
73/05/24			0.054	7.400	3.077	1.590	3.500		
73/06/22 00 00									
CMIT)-			0.194	5.100	0.770	0.950	2.630		
73/06/22 24 00									
73/07/25 08 00									
CMIT)-			0.100	6.100	3.500	1.400	3.200	5.000	5.000
73/07/27 08 00									
73/08/24			0.140	8.900	0.450	0.470	3.800		
73/09/20			0.033	10.300	4.900	4.460	7.100		
73/10/24 00 00									
CMIT)-			0.110	9.300	1.320	3.780	5.400		
73/10/24 02 00									
73/11/27 08 00									
CMIT)-			0.520	6.900	0.056	1.600	3.500		
73/11/28 08 00									
73/12/19 04 00									
CMIT)-			0.040	11.500	0.400	3.100	6.000		
73/12/20 05 00									
74/01/22 00 00									
CMIT)-			0.440	7.100	0.062	0.925	2.200		
74/01/22 02 00									
74/02/25 00 00									
CMIT)-			0.440	2.500	0.074	0.600	2.400		
74/02/25 02 00									
74/03/26			0.400	7.700	0.050<	1.250	3.150		

< VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/07/22

01010C PR01010C P315000
33 34 30.0 086 52 30.0 4
VILLAGE CREEK (BIRMINGHAM)
01 JEFFERSON CO HWY
T/HANKHEAD LAKE 033991
VILLAGE CK/ BLACK WARRIOR RIVER
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/04/11 09 00									
CP(I)-			2.369	13.200	0.300	1.890	5.250	53.800	57.900
73/04/12 09 00									
73/05/22 09 00									
CP(I)-			0.035	14.700	2.400	3.900	5.850	41.600	38.600
73/05/23 09 00									
73/06/18 09 00									
CP(I)-			0.015	21.000	4.700	4.500	8.130	31.800	30.000
73/06/19 09 00									
73/07/23 09 00									
CP(I)-			0.040	13.000	1.980	2.600	4.900	33.400	32.500
73/07/24 09 00									
73/08/14 09 00									
CP(I)-			0.037	1.540	0.960	1.460		34.400	31.100
73/08/20 09 00									
73/09/17 09 00									
CP(I)-			0.030	29.000	6.200	5.360	9.100	17.350	20.400
73/09/18 09 00									
73/10/22 09 00									
CP(I)-			0.017	23.000	5.300	5.200	8.300	29.400	29.700
73/10/23 09 00									
73/11/21 09 00									
CP(I)-			0.180	15.500	3.100	3.000	5.400	30.700	28.600
73/11/22 09 00									
73/12/18 09 00									
CP(I)-			0.030	25.000	3.900	4.000	6.800	32.200	32.000
73/12/19 09 00									
74/01/21 09 00									
CP(I)-			0.400	17.300	0.220	1.440	3.751	36.700	35.100
74/01/22 07 00									
74/02/20 09 00									
CP(I)-			0.840	7.300	0.140	1.560	3.600	52.400	41.400
74/02/21 07 00									
74/03/21 09 00									
CP(I)-			0.040	18.000	4.900	3.250	7.560	44.500	40.500
74/03/22 07 00									

STORET RETRIEVAL DATE 74/07/22

01010M PH01010M P010000*
33 35 10.0 086 48 30.0 4
FIVE MILE CREEK (BIRMINGHAM)
01 JEFFERSON CO MBY
TARRANMEAD LAKE 033942
FIVE MILE CREEK
11FEALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/03/30	09 00								
CHIEF-			0.150	0.600	0.115	0.750	2.100		
73/03/31	24 00								
73/04/24	00 00								
CHIEF-			0.720	4.330	0.189	0.900	2.200		
73/04/24	24 00								
73/05/24			0.950	7.400	0.077	1.590	3.500		
73/05/22	00 00								
CHIEF-			0.140	5.100	0.770	0.950	2.630		
73/05/22	24 00								
73/07/24	08 00								
CHIEF-			0.100	4.100	0.500	1.500	3.200	0.000	0.000
73/07/27	00 00								
73/08/24			0.150	8.400	0.450	0.470	3.900		
73/09/20			0.033	10.300	0.900	0.460	7.100		
73/10/24	00 00								
CHIEF-			0.810	9.300	1.320	3.780	5.400		
73/10/24	07 00								
73/11/27	04 00								
CHIEF-			0.520	6.400	0.056	1.600	3.500		
73/11/28	08 00								
73/12/19	04 00								
CHIEF-			0.040	11.500	0.900	3.100	5.000		
73/12/26	24 00								
74/01/22	00 00								
CHIEF-			0.440	7.100	0.062	0.925	2.200		
74/01/22	07 00								
74/02/25	00 00								
CHIEF-			0.440	2.500	0.074	0.600	2.400		
74/02/25	07 00								
74/03/20			0.500	7.700	0.050<	1.250	3.150		

< VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/07/22

01010C PR0101DC P315000
33 34 30.0 086 52 30.0 4
VILLAGE CREEK (BIRMINGHAM)
01 JEFFERSON CO MBY
T/BANKHEAD LAKE 033991
VILLAGE CR/ BLACK WARRIOR RIVER
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/04/11	09	00							
CP(T)-			2.360	13.200	0.300	1.890	5.250	53.800	57.900
73/04/12	09	00							
73/05/22	09	00							
CP(T)-			0.035	14.700	2.400	2.900	5.850	41.600	38.600
73/05/23	09	00							
73/06/18	09	00							
CP(T)-			0.016	21.000	4.700	4.500	8.100	31.800	30.000
73/06/19	09	00							
73/07/23	09	00							
CP(T)-			0.040	13.000	1.980	2.600	4.900	33.400	32.500
73/07/24	09	00							
73/08/19	09	00							
CP(T)-			0.037	1.540	0.960	1.460		34.400	31.100
73/08/20	09	00							
73/09/17	09	00							
CP(T)-			0.030	29.000	6.200	5.360	9.100	17.300	20.800
73/09/18	09	00							
73/10/22	09	00							
CP(T)-			0.017	23.000	5.300	5.200	8.300	29.900	29.700
73/10/23	09	00							
73/11/21	09	00							
CP(T)-			0.180	15.500	3.100	3.000	5.400	30.700	28.600
73/11/22	09	00							
73/12/18	09	00							
CP(T)-			0.030	25.000	3.900	4.000	8.800	32.200	32.600
73/12/19	09	00							
74/01/21	09	00							
CP(T)-			0.400	17.000	0.220	1.440	3.750	36.700	35.100
74/01/22	07	00							
74/02/20	09	00							
CP(T)-			0.840	7.300	0.140	1.560	3.600	52.400	41.400
74/02/21	07	00							
74/03/21	09	00							
CP(T)-			0.040	18.000	4.900	3.250	7.500	44.500	40.500
74/03/22	09	00							

49

STORET RETRIEVAL DATE 76/07/22

01010C PR010100 P315000
33 34 30.0 086 52 30.0 4
VILLAGE CREEK (BIRMINGHAM)
01 JEFFERSON CO HWY
T/HARRISHEAD LAKE 033991
VILLAGE CK/ BLACK WARRIOR RIVER
11EMALES 21412 4
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 N02&N03 -TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/04/23	04 00								
CHECK-			0.040	12.000	5.600	2.300	5.600	42.800	46.000
74/04/24	04 00								

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STORET RETRIEVAL DATE 80/12/22

DIVIDE ABSOLUTE 06015
39 45 00.0 107 17 00.0
PARK CO
CO WALKER CO NWS
TRANSMITTED LAKE 03991
LOST CREEK/BLACK MOUNTAIN RIVER
11EMALES 21411204
8000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO3+NO2-N TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE CFS	50053 CONDUIT FLOW-MID MEASURE
79/07/17	14	14	2.960	1.470	3.430	5.800	5.300		
79/11/05			17.600	1.100	5.280	15.800	17.300		
79/12/12	09	00	1.840	10.000	1.840	4.260	8.200		
80/01/07			4.500	4.700	2.800	7.500	12.000		

STORET RETRIEVAL DATE 78/07/22

01031EA P0010IEA P0023?4
33 45 00.0 087 04 00.0 4
COMMERCE
01 WALKER CO HWY 4A
T/HANKHEAD LAKE 033991
HORNT CORN CR/MULBERRY FK BLACK WARRIOR
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME DEPTH		00625 NITRO TOT KJEL N MG/L	00630 NO3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
78/07/20	08 00		0.140	0.900	0.060	2.000	2.400	
78/04/18	09 10		0.300	1.130	0.285	4.040	4.800	

[illegible] [illegible] DATE 78/07/27

[illegible] [illegible] [illegible] 01400000
33 30 00.0 087 14 00.0 4
JASPER STP
01 WALSH CO [illegible] MA
T/SAGAMORE LAKE 033941
TOWN CHEMUNG-HENRY FK BLACK WARRIOR RIVER
[illegible] 21AL2WA
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME DEPTH	00630 NO3+NO2-N TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
78/06/17	08 00							
CE111-		0.530	13.200	7.200	0.300	7.300	2.410	2.400
78/06/18	08 00							
78/06/19	08 00							
CE111-		7.100	17.400	9.900	1.300	0.900	2.400	2.500
78/06/11	08 00							
78/06/20	08 00							
CE111-		0.860	0.100	1.580	0.400	0.900	0.500	0.000
78/06/20	20 00							
78/07/05	08 00							
CE111-		0.700	7.500	2.400	0.400	0.400	2.900	2.900
78/07/05	20 00							
78/07/10	08 00							
CE111-		0.800	0.000	2.460	0.023		2.300	2.400
78/07/10	20 00							
78/07/17	08 00							
CE111-		0.803	2.100	0.000	7.710	0.500	1.400	1.800
78/07/17	20 00							
78/07/01	08 00							
CE111-		11.200	0.100	0.400	0.400	7.500	2.500	2.300
78/07/01	20 00							
78/11/20	08 00							
CE111-		13.000	0.500	1.980	0.300	7.730	2.100	1.900
78/11/20	20 00							
78/12/05	08 00							
CE111-		0.100	7.600	3.700	0.175	7.053	2.300	2.300
78/12/05	20 00							
78/01/07	08 00							
CE111-		7.500	3.130	1.040	2.100	2.500	3.430	3.100
78/01/07	20 00							
78/01/14	08 00							
CE111-		5.800	0.430	1.100	1.500	5.900	3.200	3.100
78/01/14	20 00							
78/01/21	08 00							
CE111-		0.500	2.200	1.350	2.100	2.800	3.400	2.900
78/01/21	20 00							

STUDY RETRIEVAL DATE 74/07/22

01015   FEDERAL   P01=0000
33 50 00.0 087 14 09.0 4
JASPER STP
01   WALKER CO HWY 9A
1/=MAURMEAD LAKE   013941
TOWN CH/MULBERRY FK BLACK WARRIOR RIVER
11=SALES   2141204
6300 FEET DEPTH CLASS 00

DATE TIME OF DAY FROM TO	DEPTH FEET	00610 NITROGEN,AMMONIA TOTAL MG/L	00625 NITROGEN,KJEL TOT N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L @	00665 PHOS-TOT MG/L @	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/04/30 00 00								
CNTIN-		0.300	0.000	0.300	0.200	0.200	2.500	2.800
74/04/30 24 00								

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DATE	TIME (EDT)	OXYGEN DISSOLVED TOTAL MG/L	ORGANIC TOT N MG/L	AMMONIA NITROGEN TOTAL MG/L	NITRITE PLUS NITRATE TOTAL MG/L N	PHOSPHORUS TOTAL MG/L P
73/03/04	11 10	0.520	1.470	0.290	0.011	0.025
73/04/08	12 15	0.410	0.800	0.115	0.008	0.030
73/05/07		0.450	2.500	0.189	0.023	0.045
73/06/03	14 25	0.500	2.400	0.360	0.058	0.195
73/07/03	13 20	0.052	2.240	0.052	0.011	0.030
73/08/03	14 50	0.510	0.520	0.210	0.0058	0.015
73/09/07	14 45	0.570	0.586	0.450	0.0258	0.015
73/10/07	14 05	0.569	1.090	0.730	0.0058	0.016
73/11/04	11 47	1.430	0.254	0.023	0.0058	0.025
73/12/04	13 55	2.520	1.300	0.158	0.0058	0.010
74/01/08	11 20	0.510	0.430	0.112	0.012	0.045
74/02/21	11 50	0.530	0.800	0.134	0.008	0.050
74/03/04	14 55	0.560	0.103	0.055	0.010	0.020
74/03/15	12 15	0.560	0.500	0.190	0.010	0.045

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/07/22

010542 L5010542
33 15 30.0 087 26 30.0 4
BLACK WARRIOR RIVER
01 MAP TUSCALOOSA C
O/HOLT LOCK AND DAM 033991
SAMPLE AT HOLT LOCK AND DAM
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/04	11 25		0.530	2.100	0.220	0.010	0.025
73/04/11	12 50		0.410	2.310	0.260	0.007	0.025
73/05/07	18 30		0.430	2.400	0.190	0.029	0.040
73/06/11	08 50		0.540	0.780	0.465	0.011	0.030
73/06/28	06 30		0.640	0.350	0.018	0.005K	0.015
73/08/01	07 30		0.590	0.420	0.189	0.005K	0.010
73/09/01	07 30		0.620	0.170	0.179	0.010	0.015
73/10/02	08 00		0.890	0.440	0.052	0.009	0.010
73/11/07	09 30		0.830	0.200	0.033	0.005K	0.020
73/12/04	10 20		1.510	0.200	0.016	0.005K	0.005K
74/01/16	11 30		0.720	1.600	0.140	0.012	0.050
74/01/29	09 00		0.790	0.232	0.232	0.008	0.030
74/02/12	09 30		0.630	0.500	0.145	0.010	0.017
74/02/28	08 30		0.540	0.500	0.115	0.005	0.050

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/07/22

01054I LS016541
33 16 00.0 087 25 00.0 4
ROCKY BRANCH
01 MAP TUSCALOOSA C
T/HOLT LOCK AND DAM 033941
GULF MOBILE OHIO RR BRDG 6 W BROOKWOOD
11ALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/04	12 45		0.440	1.140	0.110	0.007	0.020
73/04/11	12 10		0.360	2.100	0.147	0.008	0.030
73/05/07	14 45		0.410	1.260	0.110	0.021	0.045
73/05/31	09 50		0.520	0.560	0.280	0.006	0.020
73/06/24	05 45		0.640	0.420	0.024	0.005K	0.020
73/08/01	04 30		0.580	0.420	0.160	0.005K	0.010
73/09/01	10 00		0.550	0.200	0.126	0.005K	0.010
73/10/02	04 05		0.470	0.170	0.033	0.005K	0.010
73/11/07	10 00		0.780	0.400	0.029	0.005K	0.015
73/12/11	11 00		1.600	0.200	0.020	0.005K	0.005K
74/01/12	12 05		0.335	0.700	0.092	0.005K	0.020
74/01/26	04 25		0.580	0.400	0.142	0.005K	0.025
74/02/12	10 05		0.584	0.120	0.120	0.010	0.015
74/02/28	09 00		0.540	0.400	0.115	0.005	0.045

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/07/22

01050I L50105C1
33 15 00.0 087 25 30.0 4
UNNAMED STREAM
01 MAP TUSCALOOSA C
T/MULT LOCK AND DAM 033991
END RD NEAR BUILDING 1.5 MI N PETERSON
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/01/04	11 50		0.480	1.000	0.138	0.007	0.030
73/04/11	12 35		0.360	2.700	0.168	0.008	0.025
73/05/07	07 00		0.410	0.940	0.147	0.025	0.040
73/05/31	09 25		0.540	1.300	0.390	0.009	0.025
73/06/28	06 40		0.710	0.450	0.048	0.014	0.015
73/08/01	08 15		0.610	0.350	0.160	0.005K	0.010
73/09/01	08 00		0.570	0.140	0.110	0.005K	0.010
73/10/02	08 20		0.880	0.245	0.032	0.005K	0.010
73/11/07	09 15		0.770	0.350	0.028	0.005K	0.005K
73/12/11	10 50		1.520	0.300	0.020	0.005K	0.005K
74/01/12	11 45		0.730	0.700	0.172	0.008	0.030
74/02/26	09 15		0.390	0.100K	0.056	0.005K	0.025
74/03/12	09 55		0.580	0.300	0.110	0.010	0.010
74/03/28	08 45		0.570	0.500	0.140	0.005	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

STREET RETRIEVAL DATE 76/07/22

010501
33 20 00.0 087 24 30.0 4
PEQUES CREEK
01 TUSCALOOSA CO AA
T/HOLT LOCK & DAM 033991
BRDG NEAR MOWELLS FISHING CAMP
TIDALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/11	10	25	0.154	0.860	0.082	0.005K	0.020
73/05/07	11	20	0.320	2.310	0.120	0.018	0.020
73/05/31	10	20	0.349	0.310	0.150	0.005K	0.010
73/06/28	07	00	0.560	0.280	0.048	0.005K	0.015
73/08/01	09	00	0.570	0.315	0.138	0.005K	0.007
73/09/01	10	45	0.420	0.100K	0.091	0.005K	0.005K
73/10/02	09	35	0.590	0.220	0.075	0.005K	0.010
73/11/07	10	15	1.080	0.250	0.017	0.005K	0.007
73/12/11	11	50	1.260	0.400	0.020	0.005K	0.005K
74/01/04	14	26	0.200	0.500	0.072	0.008	0.020
74/01/12	12	45	0.060	0.400	0.036	0.005K	0.015
74/01/25	09	50	0.132	0.100K	0.040	0.005K	0.010
74/02/12	10	45	0.232	0.100K	0.060	0.005K	0.005K
74/02/26	09	10	0.132	0.300	0.055	0.005K	0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/07/22

01056I
33 23 20.0 087 24 30.0 4
DAVIS CREEK
01 TUSCALOOSA CO AL
T/HULT LOCK & DAM 333991
CO HWY 59 BRDG 2.5 MI NE OF ANTIOCH CHUR
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/11	11	20	0.160	2.520	0.110	0.005K	0.030
73/05/07	09	50	0.231	0.815	0.050	0.005K	0.005K
73/05/31	11	00	0.231	1.540	0.126	0.010	0.025
73/06/28	07	35	0.189	0.220	0.021	0.005K	0.010
73/08/01	09	10	0.490	0.120	0.048	0.005K	0.010
73/09/01	11	30	0.350	0.170	0.035	0.005K	0.005K
73/10/02	10	30	0.180	0.540	0.154	0.005K	0.045
73/11/07	10	35	1.500	0.400	0.025	0.005K	0.010
73/12/11	11	35	1.700	0.600	0.016	0.005K	0.010
74/01/12	13	20	0.136	0.800	0.032	0.005K	0.035
74/01/25	10	10	0.160	0.100K	0.036	0.005K	0.015
74/02/12	11	20	0.480	0.700	0.150	0.010	0.020
74/02/28	09	10	0.540	0.400	0.105	0.015	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/07/22

01055F1
33 27 15.0 087 34 35.0 4
BLUE CREEK
01 TUSCALOOSA CO MA
T/HOLT LOCK & DAM 033992
CO HWY 47 BRDG SW OF SPENCER HILL CHURCH
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	01610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/04/08	10 35		0.030	3.150	0.078	0.006	0.025
73/05/04	11 40		0.034	2.650	0.220	0.005K	0.020
73/06/03	09 45		0.036	0.520	0.052	0.007	0.025
73/07/08	12 00		0.600	0.500	0.180	0.005K	0.015
73/08/03	15 15		0.026	0.140	0.012	0.005K	0.025
73/09/07	15 05		0.010K	0.190	0.024	0.005K	0.020
73/10/07	14 30		0.037	0.585	0.046	0.005K	0.020
73/11/04	13 50		0.010K	0.250	0.039	0.005K	0.015
73/12/04	11 15		0.028	0.500	0.044	0.005K	0.010
74/01/06	12 35		0.044	0.500	0.012	0.005K	0.010
74/01/21	10 15		0.072	0.100K	0.044	0.005K	0.025
74/02/12	14 20		0.060	0.100K	0.010	0.005K	0.010
74/02/15	12 30		0.044	0.500	0.050	0.005	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

APPENDIX E

PARAMETRIC RANKINGS OF LAKES SAMPLED BY NES IN 1974 STATE OF ALABAMA

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
0101	BANKHEAD LAKE	0.029	0.770	452.667	4.017	14.900	0.007
0103	GANTT RESERVOIR	0.029	0.300	465.778	2.144	14.000	0.008
0104	GUNTERSVILLE RESERVOIR	0.044	0.480	461.111	8.567	12.200	0.014
0105	HOLT LOCK AND DAM	0.018	0.835	449.417	2.183	13.600	0.006
0106	LAY LAKE	0.075	0.390	470.778	7.656	13.000	0.032
0107	MARTIN LAKE	0.017	0.170	435.250	6.407	15.000	0.004
0104	MITCHELL LAKE	0.053	0.290	466.000	6.211	12.400	0.022
0109	PICKWICK LAKE	0.056	0.535	455.000	2.450	11.900	0.035
0112	WEISS RESERVOIR	0.092	0.260	478.389	11.261	14.900	0.034
0114	WILSON LAKE	0.053	0.460	447.714	7.400	10.200	0.022
0115	LAKE PURDY	0.049	0.170	437.889	12.711	15.000	0.014

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HI MEM VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN 70	MEDIAN DISS ORTHO P	INDEX NO
0101	HAMMOND LAKE	75 (7)	10 (1)	60 (6)	70 (7)	25 (2)	80 (8)	320
0103	GANTT RESERVOIR	75 (7)	60 (6)	30 (3)	100 (10)	40 (4)	70 (7)	375
0104	GUNTERSVILLE RESERVOIR	60 (6)	30 (3)	40 (4)	20 (2)	80 (8)	55 (5)	285
0105	HOLT LOCK AND DAM	90 (9)	0 (0)	70 (7)	90 (9)	50 (5)	90 (9)	390
0106	LAY LAKE	10 (1)	50 (5)	10 (1)	40 (4)	60 (6)	20 (2)	190
0107	MARTIN LAKE	100 (10)	95 (9)	100 (10)	50 (5)	5 (0)	100 (10)	450
0108	MITCHELL LAKE	40 (4)	70 (7)	20 (2)	60 (6)	70 (7)	35 (3)	295
0109	PICKWICK LAKE	20 (2)	20 (2)	50 (5)	80 (8)	90 (9)	0 (0)	260
0112	WEISS RESERVOIR	0 (0)	80 (8)	0 (0)	10 (1)	25 (2)	10 (1)	125
0114	WILSON LAKE	30 (3)	40 (4)	80 (8)	30 (3)	100 (10)	35 (3)	315
0115	LAKE PURDY	50 (5)	95 (9)	90 (9)	0 (0)	5 (0)	55 (5)	295

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	0107	MARTIN LAKE	450
2	0105	HOLT LOCK AND DAM	390
3	0103	GANTT RESERVOIR	375
4	0101	BANKHEAD LAKE	320
5	0114	WILSON LAKE	315
6	0115	LAKE PURDY	295
7	0108	MITCHELL LAKE	295
8	0104	GUNTERSVILLE RESERVOIR	285
9	0109	PICKWICK LAKE	260
10	0106	LAY LAKE	190
11	0112	WEISS RESERVOIR	125